but against the *relaxed* diaphragm—relaxed, that is, by the abdominal muscles drawing down the lower ribs, and thus contracting the circumference of the lower part of the chest.

The intercostal muscles also contribute importantly to this result, as the effect of their contraction is reversed, by the lower ribs being relatively fixed during the action of the abdominal muscles. In this way both the long diameter and circumference of the chest are abridged.

10. The upper and lower costal movements in both sexes, when entirely unfettered, are equal, in ordinary inspiration and in the uncontracted chest.

The costal movements, both upper and lower, are much greater in forced inspiration in the male than in the female.

In both, the lower costal movements are much abridged by compression of the abdomen and lower part of the chest, while the upper costal movements are exaggerated.

The observed fact that women breathe more by the chest than by the abdomen is due to artificial compression, and to the altered form of the chest consequent on its early adoption.

February 1, 1872.

Sir JOHN LUBBOCK, Bart., Vice-President, in the Chair.

The following communications were read :—

I. "On the Lunar Variations of Magnetic Declination at Bombay." By CHARLES CHAMBERS, F.R.S., Superintendent of the Colaba Observatory. Received December 4, 1871.

(Abstract.)

This paper is in continuation of that "On the Solar Variations of Magnetic Declination at Bombay," published in the Philosophical Transactions for 1869; but the discussion is confined to the observations of the years 1861 to 1863, which alone have as yet been reduced. The point of principal interest brought out in the discussion is that whilst the mean lunar-diurnal variation is of the ordinary character, having as its principal feature a double oscillation in the lunar day, its range is very small as compared with the several ranges of the lunar-diurnal variations when the sun and moon have several specific varieties of relative position; and moreover, although in those latter variations the double oscillation is generally preserved as a main feature, correspondence of phase in the representative curves is as generally absent; and in some cases the curves are, whilst systematic, altogether different in character from the mean lunar-diurnal variation curve. The semiannual inequality in the lunar-diurnal variation,

whilst it is as definitely systematic, has twice the range of the mean lunar-diurnal variation; and it is also subject to remarkable modifications which accompany changes of phase of the moon.

II. "Note on a possible Ultra-Solar Spectroscopic Phenomenon." By C. Piazzi Smyth, F.R.S., Astronomer Royal for Scotland. Received December 13, 1871.

One great object with the solar-eclipse expeditionists at work to-day in the far East is to trace spectroscopically the existence of any faint solar luminous appendage to a further distance from the sun than the brighter parts of the corona hitherto so identified.

But *much* further they cannot go, on account of the large amount of general atmospheric illumination during every lunar-solar eclipse. The matter may, however, be taken up again during a *terrestrial* solar eclipse, *i. e.* an ordinary sunset below the horizon, if the sun be sufficiently far below to terminate *all* aërial twilight. Under such circumstances, too, it is that the zodiacal light, historically called the sun's atmosphere, is occasionally seen stretching away to distances of 60, 90, and even more degrees from the sun.

Now I have recently been trying to test in this manner an alleged foreign observation of the zodiacal light's spectrum, but in vain. Some sort of faint bluing of the dark night sky there certainly was over the north-western horizon when the sun was more than 18° vertically below, and its spectrum I noted at the time, but only as being that of the very last of the twilight.

Perhaps it was only that; but perhaps, also, it may have been the direct light of some solar appendage approximating to the outer coronal region; for, on making up the accompanying plate* of nine observed spectra, and comparing them with a tabular solar spectrum, a wide distance was manifested between the place of maximum light in the solar continuous spectrum, as given by Fraunhofer, or near wave-length 5620, and in my so-called residual twilight spectrum, which was wave-length 5300.

I tested, therefore, lately Fraunhofer's value for the solar spectrum in my own night-apparatus, by darkening its objective to all but extinction with four thicknesses of linen cloth in the middle of a dull, grey day, and found for the last visible portion of continuous spectrum wave-length 5700 nearly; that is, Fraunhofer's value was confirmed, and my residual-twilight spectrum left anomalous as regards the ordinary solar spectrum, but remarkably agreeable with the corona spectrum, whose chief line has wave-length 5322, and which spectrum has been shown by Mr. Lockyer to decrease its number of lines, and tend to form a faint continuous spectrum, as it thins out with increase of distance from the sun's limb.

* See plate 54, vol. xiii., "Astronomical Observations made at the Royal Observatory, Edinburgh."